

CLAIMS

1. An image processing device composed such that it displays a prescribed object whilst changing the shape thereof, comprising:

a first memory for recording information for first polygons which form a portion of said object;

a second memory for recording information for second polygons, which form a further portion of said object and are linked to said first polygons; and

processing means for changing the shapes of said second polygons in accordance with movement of said first polygons on the basis of the first polygon information recorded in said first memory and the second polygon information recorded in said second memory, when the shape of said object is changed, such that no gaps are produced between said first polygons and said second polygons.

2. The image processing device according to claim 1, wherein said object comprises a plurality of said first polygons, and said second polygons are positioned such that no gaps are formed between said second polygons and said first polygons.

3. The image processing device according to claim 1, wherein said first polygons and said second polygons share vertices in a portion thereof; information for said first polygons and information for said second polygons is represented such that the vertices of either a first polygon or a second polygon refer to the vertices of the other polygon; and said processing means uses

information for the vertices of one polygon in drawing the other polygon.

4. The image processing device according to claim 3,
5 wherein, when information for said first polygons and information for said second polygons is represented by index values in a buffer which stores information for respective polygon vertices, the sharing of vertices is represented by setting said index values to negative values.

10 5. The image processing device according to claim 1, wherein said object is applied to a person, animal, or the like, appearing in a game and said second polygons are applied to regions of said object which bend.

15 6. The image processing device according to claim 5, wherein said second polygons are applied to the head of said object.

20 7. The image processing device according to claim 5, wherein said second polygons are applied to a region from the chest to below the armpits of said object.

25 8. The image processing device according to claim 5, wherein said second polygons are applied to the elbows and wrists of said object.

9. The image processing device according to claim 5, wherein said second polygons are applied to a region from the feet

to the toes of said object.

10. The image processing device according to claim 5,
wherein selectable texture data is mapped onto at least one of said
5 first polygons and said second polygons.

11. The image processing device according to claim 10,
wherein said texture data is generated on the basis of a photograph
of a human face taken using a three-dimensional scanner.

12. The image processing device according to claim 10,
wherein said texture data simulates clothing.

13. An image processing method for displaying a prescribed
15 object whilst changing the shape thereof, comprising a processing step
whereby, when the shape of said object changes, the shapes of second
polygons linked to first polygons comprising said image are changed
in accordance with the movement of said first polygons such that no
gaps are produced between said first polygons and said second polygons.

20 14. The image processing method according to claim 13,
wherein said first polygons and said second polygons share vertices
in a portion thereof; the vertices of a first polygon or a second polygon
are represented by referring to the vertices of the other polygon;
25 and said processing step uses information for the vertices of one
polygon in drawing the other polygon.

15. A recording medium whereon programs for causing the

processing steps according to claim 13 or claim 14 to be implemented in a computer are stored.

16. An image processing device composed such that it can display a prescribed object whilst moving said object, comprising:
a memory which records information relating to a first element, a second element and a third element, which are mutually linked and form said object; and

a processing section which changes the shape of said first element and said second element about prescribed axes, on the basis of the information recorded in said memory, and which conducts processing on the basis of the positional relationship between said second element and said third element, when said prescribed axes cannot be determined on the basis of said first element and said second element.

17. The image processing device according to claim 16, wherein said processing section changes the shape of said first element and said second element about a normal to these elements, and when said first element and said second element lie on a straight line, it changes the shape about a normal to said second element and said third element.

18. An image processing method whereby a prescribed object is displayed whilst being moved, comprising:

a first step whereby, with respect to a first element, a second element and a third element which are mutually linked and form said object, the shape of said first element and said second element

are changed about prescribed axes;

and a second step whereby processing is conducted on the basis of the positional relationship between said second element and said third element, when said prescribed axes cannot be determined on the basis of said first element and said second element.

19. The image processing method according to claim 18, wherein said first step changes the shape of said first element and said second element about a normal to these elements; and said second step changes the shape about a normal to said second element and said third element, when said first element and said second element lie on a straight line.

20. This invention is a recording medium whereon programs for causing processing steps according to claim 18 or claim 19 to be implemented in a computer are recorded.

21. An image processing device which displays an image of which an object is captured from a viewpoint in a virtual space, comprising:

presentation control means for controlling the presentation of an image containing said object which changes in shape;

viewpoint determining means for determining the position of a viewpoint for capturing an image containing said object by means of said presentation control means; and

recording means for recording an image obtained from the viewpoint determined by said viewpoint determining means.

22. The image processing device according to claim 21, wherein said presentation control means changes the shape of said object on the basis of data obtained by capturing the movement of each part of an object moving in a real space.

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23. The image processing device according to claim 22, wherein said presentation control means uses texture data obtained by scanning a portion of said object by means of a three-dimensional scanner as texture data for a portion of said object.

24. The image processing device according to claim 21, wherein said presentation control means selects, on the basis of the player's operations, the shape of said object, the pattern of change in this object, the type of texture data applied to this object, or the type of sound emitted when said object changes shape.

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25. The image processing device according to claim 21, wherein said presentation control means displays at least one other object which is different to said object, and changes the shape of this other object also.

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26. The image processing device according to claim 21, wherein said presentation control means conducts a presentation wherein prescribed illumination is provided in accordance with changes in the shape of said object.

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27. The image processing device according to claim 21, wherein said presentation control means conducts a presentation

wherein a prescribed image pattern appears in a position corresponding to the foreground or background of said object, in accordance with the change in the shape of said object.

5 28. The image processing device according to any of claims 21 to 27, wherein said recording means can pause recording of said image on the basis of the player's operations, and said presentation control means can change the presentation of this image whilst the recording of the image is paused by said recording means.

10 29. The image processing device according to claim 21, wherein said viewpoint determining means changes the relative position information of said viewpoint to said object on the basis of the player's operations.

15 30. The image processing device according to claim 29, wherein said recording means pauses the recording of said image on the basis of the player's operations, and said viewpoint determining means changes the position of said viewpoint whilst the recording of
20 the image is paused by said recording means.

25 31. The image processing device according to claim 21, wherein said recording means reproduces a recorded series of images at the same speed as that used when recording these images.

 32. The image processing device according to claim 21, wherein said recording means reproduces a recorded series of images at a different speed to that used when recording these images.

33. The image processing device according to claim 21, wherein said recording means reproduces a recorded series of images in a different sequence to that used when recording these images.

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34. An image processing device according to claim 29, wherein said virtual space has an inhibited area in which said viewpoint can not be located, and

said viewpoint determining means changes said viewpoint position information out of said inhibited area.

35. An image processing method for displaying a prescribed object whilst changing the shape of said object, comprising:

a presentation control step for controlling the presentation of an image containing said object which changes in shape;

a viewpoint determining step for determining the position of a viewpoint for capturing an image containing said object by means of said presentation control step; and

a recording step for recording images obtained from the viewpoint determined by said viewpoint determining step.

36. The recording medium whereon programs for causing processing steps according to claim 35 to be implemented in a computer are recorded.

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37. A game image display method for displaying images wherein an image of an object located in a virtual space is captured from a certain viewpoint, an image processing method comprising the

steps of:

positioning a first object and a second object in said virtual space such that said second object is rotatable in one direction with respect to said first object, whilst its rotation in the other
5 direction is restricted;

inserting an elastic object between said first and second objects, which expands and contracts such that no gap is produced between said first and second objects with the rotation of said second objects;

10 preparing data for said elastic object such that said elastic object has a larger surface area on the side of the smaller angle formed between said first and second objects when said second object is rotated with respect to said first object, than its surface area on the opposite side.